

What is claimed is:

1. A phase contrast radiographic image processing apparatus, comprising:
 - a management information storing section to store management information regarding a radiography; and
 - an image processing section to apply an image processing onto a phase contrast radiographic image produced by the phase contrast radiography, wherein the image processing section determines an image processing condition based on the management information stored in the management information storing section and conducts the image processing based on the determined image processing condition.
2. The phase contrast radiographic image processing apparatus of claim 1, wherein the management information indicates information regarding radiography for an object to be radiographed and an identification of the object.
3. The phase contrast radiographic image processing apparatus of claim 2, wherein the information regarding the radiography includes at least one of a section to be radiographed, a radiographing attitude, a radiographing method, a radiographing condition, a kind of a radiation

image such as a phase contrast radiographic image or an ordinary radiographic image, a sampling pitch in a detector, and an object of a diagnosis.

4. The phase contrast radiographic image processing apparatus of claim 3, wherein the radiographing condition includes at least one of a tube current, a positional relationship among a radiation date, a X-ray tube and an object to be radiographed, an enlargement ratio, and information whether or not a grid to eliminate scattered X-rays is used.

5. The phase contrast radiographic image processing apparatus of claim 1, further comprising:

a interest region setting section to set a desired interest region by analyzing the phase contrast radiographic image;

wherein the image processing section determines the image processing condition based on image signals in the interest region set by the interest region setting section.

6. The phase contrast radiographic image processing apparatus of claim 3, wherein the image processing means

comprises a gradation processing section to conduct a process to convert gradation.

7. The phase contrast radiographic image processing apparatus of claim 6, wherein the image processing means comprises a gradation conversion curve storing section to store plural gradation conversion curves and the gradation processing section selects one of the plural gradation conversion curves stored in the gradation conversion curve storing section and conducts the process to convert gradation based on the selected gradation curve.

8. The phase contrast radiographic image processing apparatus of claim 7, wherein the gradation processing section selects the one of the plural gradation conversion curves stored in the gradation conversion curve storing section based on the management information regarding the radiography.

9. The phase contrast radiographic image processing apparatus of claim 6, wherein the image processing means comprises a reference gradation conversion curve storing section to store plural reference gradation conversion curves and the gradation processing section selects one of the

plural reference gradation conversion curves stored in the reference gradation conversion curve storing section, modifies the selected reference gradation conversion curve so as to produce a desired gradation conversion curve, and conduct the process to convert gradation based on the desired gradation conversion curve.

10. The phase contrast radiographic image processing apparatus of claim 6, wherein the gradation processing section selects the one of the plural reference gradation conversion curves stored in the reference gradation conversion curve storing section based on the management information regarding the radiography.

11. The phase contrast radiographic image processing apparatus of claim 1, wherein the image processing section comprises a frequency enhancement processing section to determine a frequency enhancement processing condition based on the management information regarding the radiography and to conduct a frequency enhancement processing.

12. The phase contrast radiographic image processing apparatus of claim 1, wherein the image processing section comprises a dynamic range compression processing section to

determines a dynamic range compression processing condition based on the management information regarding the radiography and to conduct a dynamic range compression processing.

13. The phase contrast radiographic image processing apparatus of claim 1, further comprising a radiation image detecting section to output image signals corresponding to a captured phase contrast radiographic image.

14. The phase contrast radiographic image processing apparatus of claim 1, further comprising an output section to output a phase contrast radiographic image with a reduction ratio α to the size of the radiographed object.

15. The phase contrast radiographic image processing apparatus of claim 14, wherein the reduction ratio is a coefficient not larger than 1.0.

16. The phase contrast radiographic image processing apparatus of claim 14, wherein the reduction ratio is a coefficient determined based on the management information.

17. The phase contrast radiographic image processing apparatus of claim 16, wherein the reduction ratio is

determined based on an enlargement ration of the phase control method-radiation image contained in the management information.

18. The phase contrast radiographic image processing apparatus of claim 16, wherein the reduction ratio is changeable.

19. The phase contrast radiographic image processing apparatus of claim 14, wherein the output section output the phase contrast radiographic image with the size equal to that of the radiographed object.

20. The phase contrast radiographic image processing apparatus of claim 14, further comprising:

an interpolation processing condition storing section to store plural interpolation processing conditions,

wherein the output section selects one of the plural interpolation processing conditions stored in the interpolation processing condition storing section and conducts an interpolation based on the selected interpolation processing condition.

21. The phase contrast radiographic image processing apparatus of claim 20, wherein the interpolation process is one of a nearest interpolation, a spline interpolation, a cubic convolution interpolation, a bell spline interpolation.

22. The phase contrast radiographic image processing apparatus of claim 20, wherein the output section determines the interpolation processing condition based on the management information regarding the radiography stored in a radiography information storing section.

23. The phase contrast radiographic image processing apparatus of claim 14, further comprising:

an input section to input the phase contrast radiographic image,

wherein the output section conducts the interpolation processing based on information of a sampling pitch of the input section, a sampling pitch of the output section and a enlargement ratio of the phase contrast radiographic image and output the phase contrast radiographic image with the size equal to that of the radiographed object.

24. The phase contrast radiographic image processing apparatus of claim 14, wherein the output section output the

phase contrast radiographic image together with information designated among the management information regarding the radiography stored in a radiography information storing section.

25. A phase contrast radiographic image processing apparatus, comprising:

a first image processing section to apply an image processing onto a phase contrast radiographic image based on a first image processing condition; and

a second image processing section to apply an image processing onto an ordinary radiographic image based on a second image processing condition different from the first image processing condition.

26. The phase contrast radiographic image processing apparatus of claim 25, further comprising:

a interest region setting section to set a desired interest region by analyzing the phase contrast radiographic image;

wherein the image processing section determines the image processing condition based on image signals in the interest region set by the interest region setting section.

27. The phase contrast radiographic image processing apparatus of claim 25, wherein the image processing means comprises a gradation processing section to conduct a process to convert gradation.

28. The phase contrast radiographic image processing apparatus of claim 27, wherein the image processing means comprises a gradation conversion curve storing section to store plural gradation conversion curves and the gradation processing section selects one of the plural gradation conversion curves stored in the gradation conversion curve storing section and conducts the process to convert gradation based on the selected gradation curve.

29. The phase contrast radiographic image processing apparatus of claim 27, wherein the image processing means comprises a reference gradation conversion curve storing section to store plural reference gradation conversion curves and the gradation processing section selects one of the plural reference gradation conversion curves stored in the reference gradation conversion curve storing section, modifies the selected reference gradation conversion curve so as to produce a desired gradation conversion curve, and

conduct the process to convert gradation based on the desired gradation conversion curve.

30. The phase contrast radiographic image processing apparatus of claim 27, wherein the gradation processing section conducts processing on a condition that a contrast coefficient for the phase contrast radiographic image is smaller than that for the ordinary radiographic image.

31. The phase contrast radiographic image processing apparatus of claim 25, wherein the image processing section comprises a frequency enhancement processing section to conduct a frequency enhancement processing.

32. The phase contrast radiographic image processing apparatus of claim 31, wherein the frequency enhancement processing section conducts processing on a condition that a frequency enhancement coefficient for the phase contrast radiographic image is smaller than that for the ordinary radiographic image.

33. The phase contrast radiographic image processing apparatus of claim 25, wherein the image processing section

comprises a dynamic range compression processing section to conduct a dynamic range compression processing.

34. The phase contrast radiographic image processing apparatus of claim 33, wherein the dynamic range compression processing section conducts processing on a condition that a degree of correction for the phase contrast radiographic image is larger than that for the ordinary radiographic image.

35. The phase contrast radiographic image processing apparatus of claim 25, further comprising a radiation image detecting section to output image signals corresponding to a captured phase contrast radiographic image.

36. A phase contrast radiographic image processing apparatus, comprising:

an addition and/or subtraction processing section to obtain an addition and/or subtraction image by conducting an addition and/or subtraction processing for plural radiation images obtained by radiographing the same object,

wherein the plural radiation images comprises at least one sheet of a phase contrast radiographic image.

37. The phase contrast radiographic image processing apparatus of claim 36, wherein the plural radiation images are radiographed with irradiation of X-rays by a single time.

38. The phase contrast radiographic image processing apparatus of claim 36, wherein a filter containing a material absorbing a low energy component of radiation is located at least at one place among detectors.

39. The phase contrast radiographic image processing apparatus of claim 36, wherein a weight adding section to add a predetermined weight to the plural radiation images.

40. The phase contrast radiographic image processing apparatus of claim 36, further comprising:

a size and position adjusting section to adjust sizes and positions of the plural radiation images.

41. The phase contrast radiographic image processing apparatus of claim 40, further comprising:

a management information storing section to store management information regarding radiography,

wherein in the case that the management information includes an enlargement ratio, the sizes of the plural

radiation images are adjusted by the enlargement ratio and a predetermined interpolation process and thereafter the positions of the plural image are adjusted.

42. The phase contrast radiographic image processing apparatus of claim 40, further comprising:

a management information storing section to store management information regarding radiography,

wherein in the case that the management information does not includes an enlargement ratio, an enlargement ratio is obtained by analyzing the plural radiation images, the sizes of the plural radiation images are adjusted by the obtained enlargement ratio and a predetermined interpolation process and thereafter the positions of the plural image are adjusted.

43. The phase contrast radiographic image processing apparatus of claim 36, further comprising:

an abnormal shadow candidate detecting section to detect an abnormal candidate by analyzing the subtraction image.

44. The phase contrast radiographic image processing apparatus of claim 36, further comprising:

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an abnormal shadow candidate detecting section to
detect an abnormal candidate by analyzing the addition image.

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